



IMPACT OF SIMULATION-BASED TRAINING ON CRITICAL THINKING AND CLINICAL COMPETENCE IN MEDICAL- SURGICAL NURSING STUDENTS

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Abstract

The demand for competent nurses with sharp critical thinking abilities and sound clinical competence has grown exponentially in recent years due to the increasing complexity of healthcare delivery systems, particularly in medical- surgical settings. Traditional classroom lectures and occasional clinical postings often fail to bridge the gap between theoretical learning and practical skill execution. Simulation-Based Training (SBT) has emerged as a transformative strategy in nursing education, providing safe, controlled, and realistic environments where students can engage in active learning. This paper aims to evaluate the impact of simulation-based training on enhancing critical thinking and clinical competence in nursing students specializing in medical-surgical practice. Using a quasi-experimental mixed-methods design, 120 final-year nursing students were assessed through standardized tests, clinical performance checklists, and structured questionnaires. Results indicate that students exposed to simulation-based training exhibited significant improvement in critical thinking scores, clinical judgment, intervention skills, and communication, as compared to those taught through traditional methods. The findings suggest that simulation is not merely an educational supplement but a necessary pedagogical tool for preparing future nurses.

Keywords: Simulation-based training, Medical-surgical nursing, Critical thinking, Clinical competence, Nursing education, Experiential learning.

INTRODUCTION

Nursing education has historically relied on didactic classroom instruction coupled with clinical rotations in hospital wards [1]. While this approach provides essential foundational knowledge, it often falls short in equipping students with the decision-making skills required in complex medical-surgical contexts. Medical-surgical nursing is considered one of the most challenging domains of nursing practice, as it requires rapid assessment, immediate intervention, and collaborative teamwork in high-pressure scenarios such as acute myocardial infarction, sepsis management, or post-operative care complications [2].

Simulation-based training (SBT) bridges this educational gap by offering immersive,

realistic, and risk-free environments where students can practice critical interventions without jeopardizing patient safety [3]. Unlike traditional training, simulation replicates actual clinical scenarios using high-fidelity mannequins, standardized patients, or computer-assisted programs [4]. It encourages learners to engage in critical thinking, prioritize patient needs, and demonstrate psychomotor and communication skills in a holistic manner.

The importance of SBT lies in its ability to foster experiential learning, a concept rooted in Kolb's Learning Theory, where knowledge is acquired through experience, reflection, and application. For nursing students, this means transitioning from passive learners to active participants capable of making autonomous clinical



decisions. Research consistently highlights that students trained in simulation environments are more confident, better prepared, and demonstrate improved patient outcomes when they enter real-world practice [5].

This study, therefore, investigates how simulation-based training influences critical thinking and clinical competence in medical-surgical nursing students, aiming to provide empirical evidence to support its integration into nursing curricula globally [6].

METHODOLOGY

A quasi-experimental mixed-methods research design was employed to capture both the measurable outcomes of simulation training and the subjective experiences of participants.

Participants

A total of 120 final-year undergraduate nursing students from three institutions participated. They were randomly assigned into two groups: the experimental group (n = 60), which received simulation-based training, and the control group (n = 60), which continued with traditional classroom and clinical postings [7].

Research Design

- **Experimental Group:** Underwent eight weeks of simulation-based training, attending 3-hour weekly sessions in high-fidelity simulation labs.
- **Control Group:** Continued with conventional lectures, skill lab demonstrations, and ward-based clinical postings [8].

Instruments

- **Watson-Glaser Critical Thinking Appraisal (WGCTA):** Used to assess analytical reasoning, inference, and problem-solving ability.
- **Clinical Competence Checklist:** Developed by nursing faculty to evaluate assessment, decision-making, intervention, communication, and documentation.
- **Structured Questionnaire:** Designed to collect student perceptions of simulation training.

Data Analysis

Table 1: Pre-test and Post-test Scores of Critical Thinking (Mean ± SD)

Group	Pre-test Score	Post-test Score	p-value
Experimental Group	55.3 ± 6.1	78.6 ± 5.4	<0.001
Control Group	54.9 ± 5.8	60.2 ± 6.3	0.054

Table 2: Clinical Competence Performance Scores (%)

Competence Area	Experimental Group	Control Group
Patient Assessment	88%	65%

Procedure

The simulation scenarios included:

- **Acute myocardial infarction (AMI):** Students had to assess chest pain, interpret ECG changes, administer oxygen, and prepare for thrombolysis.
- **Sepsis case:** Required recognition of early warning signs, fluid resuscitation, and antibiotic administration.
- **Post-operative hemorrhage:** Students identified rapid deterioration, performed interventions, and escalated to surgeons.

Facilitators conducted pre-briefing, scenario execution, and debriefing after each session. Debriefing emphasized reflective practice and peer learning.

Data Analysis

Quantitative data were analyzed using paired t-tests and ANOVA to measure differences between groups, while qualitative data from student feedback were subjected to thematic analysis to identify common perceptions and learning experiences [9].

Case Study

One illustrative simulation involved a post-operative patient presenting with hypovolemic shock. The scenario tested students' abilities in rapid recognition and intervention.

- **Experimental Group Performance:** Students quickly assessed vital signs, identified tachycardia and hypotension, initiated IV fluid resuscitation, and called for physician assistance. Their actions were coordinated, and they documented interventions accurately.
- **Control Group Performance:** Students hesitated, sought instructor guidance repeatedly, and delayed fluid initiation. Documentation was incomplete, and communication with the healthcare team was fragmented.

This case highlighted how simulation promotes self-reliance, teamwork, and the ability to act decisively under pressure [10].

Interpretation:

The experimental group showed a statistically significant improvement in critical thinking, whereas the control group's improvement was marginal and not significant.



Decision-Making	84%	62%
Intervention Skills	90%	70%
Team Communication	85%	60%
Documentation Accuracy	87%	66%

Interpretation: Students exposed to SBT consistently outperformed their peers, with the most significant differences seen in intervention skills and team communication.

Questionnaire (Student Perceptions)

1. Simulation enhanced my critical thinking ability. (94% agreed)
2. I feel more confident in managing medical-surgical patients after simulation training. (91% agreed)
3. Simulation provided a safe environment to practice and learn from mistakes. (96% agreed)
4. Team communication and collaboration improved during simulation sessions. (89% agreed)
5. I prefer simulation-based training over traditional classroom learning. (87% agreed)

Qualitative Themes:

- Students reported decreased anxiety when transitioning to real clinical wards.
- Many highlighted that making mistakes in a safe environment improved long-term retention.

- Team-based learning fostered collaboration and leadership qualities.

CONCLUSION

The findings of this study clearly establish that simulation-based training is superior to traditional teaching methods in enhancing both critical thinking and clinical competence among nursing students. It provides an active, student-centered learning platform that emphasizes experiential learning and bridges the gap between theory and clinical practice. Simulation equips learners with confidence, practical skills, and decision-making abilities essential for safe patient care in medical-surgical nursing.

As healthcare systems continue to evolve, integrating simulation into nursing curricula is not optional but necessary. Nursing educators and policymakers must recognize its value and ensure adequate investment in simulation facilities and faculty development. Future research may focus on the long-term impact of simulation training on professional practice and patient outcomes after graduation.

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